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PEST CONTROL

"FETTERED DEATH"

by Marcela Cechova

- Czechoslovakia -

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PEST CONTROL

"FETTERED DEATH"

- Czechoslovakia -

(Following is a translation of an article by Marcela Cechova in the Czech language periodical Vlasta, Vol. XVI, No. 32, Prague, 7 August 1962, pages 8-9).

It happened in 1956. A small card appeared on the door of the Department for Pest Control of the Biological Institute of the Czechoslovak Academy of Sciences. The card carried the name of Dr. Jirina Vankova. As a graduate biologist, she put on her new white coat for the first time at her new place of work. These are not any more university laboratories, where the young girl student only played with simple problems. The white card on the door means responsibility for independent work.

Jirina was particularly tempted by one of those strange assignments. While she was still going to school, the students used to go a lot in the fields and vegetable gardens to study practical problems. Each year in the spring, the students saw the tense faces of the gardeners. What will the year be like? If there are too many pests, it would mean the end of hopes for a good harvest. Caterpillars of the innocent cabbage butterfly cannot bring destruction to a vegetable field. Chemical spray? Yes, that helps, but sprays destroy not only the caterpillar of the cabbage butterfly. They also destroy their natural enemies, and the entire cycle is repeated in the spring again. No, a chemical spray is not the right way to do it.

We shall go about it in a different way. How about multiplying the natural enemies of the harmful insects? Dr. Weiser of the Biological Institute found in a warehouse dead caterpillars of the Paprika butterfly (zavijec paprikevy?). What caused their deaths, since only recently they were strong, fat, full of life, and were covering bugs of beans with a cobweb of fibres? Dr. Weiser took the caterpillars to his laboratory to discover what destroyed them. He found under the microscope that in the bodies of the blackened, dead caterpillars there were millions of small sticks, which he recognized immedia-

telly as an experienced biologist as being the forms of *bacillus thuringiensis*.

This was something which was known in literature. The microbe shaped in the form of a small stick of the *thuringiensis* is able to destroy the caterpillars of the harmful insect which represents the great order of butterflies: caterpillars of the cabbage butterfly, fruit butterfly, moths, black arches, worms and butterflies, and all kinds of other pests which attack the stalks of vegetables, fodders, warehouses, and fruit. It is an interesting microbe. When it grows, it is able to create peculiar crystallic bodies in the form of lozenges and consisting of a kind of protein. Other microbes are also not poisonous to insects. At the same time it is interesting to know that the bacillus becomes destructive only in the period of his development when it creates these crystals and spores.

Notes in professional literature ended at this point. Nobody knew the secret which is contained in the *bacillus thuringiensis* and which is the bearer of the deadly poison. And then, what are the optimum conditions under which the bacilli can multiply as fast as possible and kill caterpillars effectively?

Revelation of secret

Jirina Vankova locked herself in her laboratory. She did not count the hours spent at the microscope and pages which were full of graphs and calculations. But after less than a year she knew quite certainly what up to the time was still a subject of conjectures and arguments among scientists of the whole world. The actual bearers of toxic matters are small bodies called inclusions, which the microbe creates during its growth. If a caterpillar eats a microbe the poison from the bodies destroys a small caterpillar almost immediately. If the caterpillar is larger, the spores and inclusions grow through the intestines of the caterpillar, they result in paralysis of the nerves and cause general poisoning. The caterpillar is unable to eat and is lost. However, this deadly poison is not harmful to biological enemies of caterpillars or to the man.

And Jirina Vankova spent again days and days at

the microscope over large trays full of fattened hairy caterpillars. The problem was how to multiply the microbes. The microbe grows slowly in the usual nutritious soil made in a laboratory, in agar placed in small dishes, and what is worse, it cannot be multiplied on a large scale within the small area of the culture surface. Agar is expensive, and therefore it would be necessary to find some other substance. The soil in which the microbe would feel "at home" and which would also be inexpensive, so that it could be produced in hundreds of hectolitres.

Yes hectolitres, that is the correct work. Agar is a solid substance, the air cannot penetrate to it easily. Wouldn't it be possible to get the microbe used to live in a liquid nourishing substance? Dr. Vankova bent over the test tubes and tried them, adds and takes away various substances and thinks how to find the best nourishing soil for the demanding microbe.

Weeks and months pass by. Dr. Jirina Vankova tried dozens of various nutritious soils. However, finally she discovered the best one, a liquid nourishing soil, which contained all the components which are required for the development of the microbes at the best ratios. She tested the soil in multiplying the microbes in small test tubes. Then she tried onion-shaped tubes. Then tanks of a capacity of 20 liters. The microbe thrived on them. The experiment was successful.

End of Trouble

One day Dr. Vankova went to the penicillin factory at Roztoky. The basic experiment in laboratory work was completed, but that was not the end of the work. The microbe is not useful to man unless it can be produced in large quantities. The factory at Roztoky had large tanks, each containing 3,000 litres and even more. We shall try them to see how our microbe will thrive in large quantities. Dr. Vankova carried a bag of the precious powder of bacteria, obtained by centrifugal elimination of the water (have you ever seen so many bacteria which would make a whole bag?), and she went to the gardens at Branik. Together with comrade Jirmerova,

director of the gardens, chief of the vegetable-growing fields, where fat and repulsive-looking caterpillars were swarming all over cabbages, cauliflower and turnips.

During the first day the caterpillars kept eating contentedly. Next day Dr. Vankova came to the experimental field, and looked! The caterpillars display a strange lassitude, they crawl over the leaves, but they do not eat. Their movements are unnatural, convulsive and finally they remain motionless.

The entire field was clean, Dr. Jirina Vankova takes a pen and writes a scientific report: "...we succeeded in discovering a method of multiplying bacillus thuringiensis. The production method is economical; multiplying them on a large scale we get 10 grams of effective substance from one litre of the nourishing soil. If we dissolve these 10 grams in 10 litres of water, we can spray an area of about 400 square meters and within five days the vegetables are free of any caterpillars. This means that cooperative members will need up to 2.5 kgs of the substance for one hectare of vegetable. When the substance is manufactured on a large scale, it is less expensive than chemical preparation, if we consider the fact that the substance is not poisonous to man".

Biologists of the entire world talk about the new results of her work. In Paris and Vienna scientists at conferences speak about the modest woman who describes in simple words her new experiments. In 1959, Dr. Jirina Vankova received one of our great scientific honors: the prize of the Academy of Sciences.

Way of the Cross

Now we are in the year 1962. The recipient of the prize of the Academy of Sciences is sitting in her study. She is sad. What happened to her discovery in the past three years? Is it serving thousands of our agricultural workers who need it so much?

No it is not. Laboratory production can never satisfy the actual requirements. Up to now there has not been a single establishment which would be willing to undertake the new production. In 1959, both Dr. Vankova and Dr. Weiser handed the production recipe to the establishment Biotika in Slovenska Lupca. The recipe was filed there for three years without anybody looking at it. There were only promises. Smart contractors in the United States and France built large factories in the meantime where they successfully manufactured this new biological miracle. After long searching, workers of Biokrm in Kourim promised that they will test the production. But only test it, because they cannot neglect other tasks, their machinery is not complete, and their plans do not include manufacture of biological means against pests.

We must ask the following question: who is actually responsible in our country for the exploitation of scientific discoveries, when a woman biologist of a world name must herself beg various establishments and wait for many precious years before her discovery can be put into effect?

Or will the complex wheels of the administrative machinery move at last and help to apply the discovery of Dr. Vankova in practice? Indeed, it is about high time.

Captions to pictures (left to right): - Ugly-looking and voracious caterpillars eat several trains of vegetables each year. - Dr. Jirina Vankova, discoverer of the excellent exterminator of caterpillars. - Long and patient work has brought results. - Here is where death is born which brings help to man. - *Bacillus thuringiensis* in agar soil placed in Petri's saucer.

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